

Translation

PATENT COOPERATION TREATY  
**PCT**

PCT/JP2003/015900



**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>FNSK0315PCT</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. <b>PCT/JP2003/015900</b>	International filing date (day/month/year) <b>11 December 2003 (11.12.2003)</b>	Priority date (day/month/year) <b>12 December 2002 (12.12.2002)</b>
International Patent Classification (IPC) or national classification and IPC <b>H02P 7/63, 21/00</b>		
Applicant <b>NSK LTD.</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
  - a. ☐ (sent to the applicant and to the International Bureau) a total of \_\_\_\_\_ sheets, as follows:
    - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
    - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
  - b. ☐ (sent to the International Bureau only) a total of \_\_\_\_\_, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- |                                               |                                                                                                                                                                 |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report                                                                                                                                             |
| <input type="checkbox"/> Box No. II           | Priority                                                                                                                                                        |
| <input type="checkbox"/> Box No. III          | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability                                                                |
| <input type="checkbox"/> Box No. IV           | Lack of unity of invention                                                                                                                                      |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI           | Certain documents cited                                                                                                                                         |
| <input type="checkbox"/> Box No. VII          | Certain defects in the international application                                                                                                                |
| <input type="checkbox"/> Box No. VIII         | Certain observations on the international application                                                                                                           |

Date of submission of the demand <b>03 June 2004 (03.06.2004)</b>	Date of completion of this report <b>01 April 2005 (01.04.2005)</b>
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

Form PCT/IPEA/409 (cover sheet) (January 2004)

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## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is language of a translation furnished for the purpose of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ The international application as originally filed/furnished
- ☐ the description:  
pages \_\_\_\_\_, as originally filed/furnished  
pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ the claims:  
pages \_\_\_\_\_, as originally filed/furnished  
pages\* \_\_\_\_\_, as amended (together with any statement) under Article 19  
pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ the drawings:  
pages \_\_\_\_\_, as originally filed/furnished  
pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP03/15900

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)

Claims

3, 5-11

YES

Claims

1, 2, 4

NO

Inventive step (IS)

Claims

YES

Claims

1-11

NO

Industrial applicability (IA)

Claims

1-11

YES

Claims

NO

## 2. Citations and explanations (Rule 70.7)

Document 1: JP, 10-295095, A (Hitachi, Ltd.), 4 November, 1998 (04.11.98), all pages (Family: none)

Document 2: CD-ROM of the specification and drawings first annexed to the written application of Japanese Utility Model Application No. 56785/1991 (Laid-open No. 2598/1993) (Honda Motor Co., Ltd.), 14 January, 1993 (14.01.93), all pages (Family: none)

Document 3: JP, 2001-18822, A (Toyota Motor Corp.), 23 January, 2001 (23.01.01), all pages (Family: none)

Document 4: JP, 9-23699, A (Yamaha Motor Co., Ltd.), 21 January, 1997 (21.01.97), all pages (Family: none)

Document 1 describes a controller for a three-phase brushless DC motor, which (1) estimates the rotational position, (2) calculates the speed from the said estimated rotational position, and (3) selects either PWM control or PAM control in response to the said speed, for performing control. Furthermore, letting the speed used for selection have hysteresis characteristics is also described.

Document 2 describes a motor controller for performing control to ensure that the motor current can be transformed into a rectangular wave current.

Document 3 describes a motor-operated power steering device for a vehicle using a brushless motor.

Document 4 describes a controller for a permanent magnet synchronous motor, which calculates the field current quantity from the torque and the rotational speed and gradually decreases the field current in relation with the rotational speed at higher than a predetermined rotational speed to prevent excessive rotation, for performing weak field control in a high speed range.

The subject matters of claims 1, 2 and 4 do not appear to be novel or to involve an inventive step in view of document 1.

The subject matter of claim 3 does not appear to involve an inventive step in view of document 1.

Using a Hall sensor for estimating or detecting the speed is a mere well-known conventional technique.

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.  
Continuation of: V

The subject matter of claim 5 does not appear to involve an inventive step in view of documents 1 and 2.  
A person skilled in the art could have easily controlled the current of the motor described in document 1 for transformation into a rectangular wave current as described in document 5.

The subject matter of claim 6 does not appear to involve an inventive step in view of documents 1-3.  
A person skilled in the art could have easily constituted a motor-operated power steering device using a brushless DC motor.

The subject matter of claim 7 does not appear to involve an inventive step in view of document 4. A person skilled in the art could have easily expressed a predetermined rotational speed using a base angular speed and a coefficient.

The subject matters of claims 8-11 do not appear to involve an inventive step in view of documents 1-4.  
A person skilled in the art could have easily performed weak field control as described in document 4 at higher than a certain rotational speed in the motor control described in document 1.